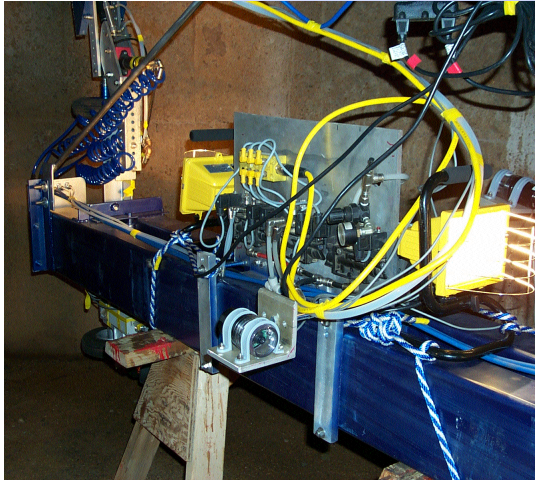


# TECHNOLOGY@ROCKY FLATS

## DEMONSTRATION & DEPLOYMENT SUMMARY SHEET



OST Support Resolves  
B771 Stack  
Characterization

### Summary

Building 771 began operation in 1953 as the first plutonium processing facility at the Rocky Flats Environmental Technology Site (RFETS). The building's ventilation system was configured in a series of filter plenums designed to capture airborne radionuclides resulting from plutonium operations, and the exhaust filtered air through the buildings' ventilation stack. In preparation for the eventual demolition of Building 771, all surfaces must be surveyed for radiological contamination, including the interior of the ventilation stack, to ensure radiation levels are within free-release tolerances for demolition. This posed a unique problem due to the stack's 170-foot height, potential exposure and high winds at the site. In order to reduce worker exposure to the numerous safety hazards presented with conventional access methods, such as erecting scaffolding inside the stack or lowering workers into the stack in a basket suspended from a crane, alternative methods were investigated by RFETS with shared funds from Office of Science and Technology. Building 771 Closure Project teamed with TMR Associates to deploy an unmanned mobile platform to perform the radiological survey. The platform was designed to the stack specifications that attached to an arch with a winch to guide and tow the platform during surveying. It was fitted with several survey instruments and two cameras used during

navigation of the platform. The survey was successfully completed in the summer of 2001 and essentially eliminated most safety hazards to RFETS workers.

### The Need

During 771's lifespan, normal operations created airborne radiocative contamination in gloveboxes and other enclosures. Along with this, numerous spills occurred within the facility and one major fire occurred in 1957. The ventilation stack is approximately 170-feet tall, with an interior diameter of approximately 17 feet at the base and 6 feet at its peak. Approximately 676 survey measurements were required, four at every 90 degrees of the stack's interior diameter at 1-foot vertical intervals. Using traditional methods, surveys in the upper portion of the stack would not be attainable. The Closure Project was also concerned about the physical conditions inside the stack and the potential for falls, radiological concerns in the event of a breach of the filtering system, wind speeds of up to 60 miles per hour, and high noise levels. The Closure team needed a safer alternative to replace the conventional access methods of scaffolding or a suspended personnel basket.

## The Technology

The equipment designed to perform the survey utilized a unique remote-operated, unmanned platform equipped with radiological measuring devices and video cameras to conduct a visual inspection of the stack interior for any obvious damage. The platform was suspended from a lifting device placed on top of the stack, and the platform movements and the equipment itself were pneumatically controlled from an operations center located outside at the base of the stack. All of the equipment used, along with the measuring methods employed, was in compliance with DOE standards and regulations.

## The Project

The effort to survey the interior of the B771 Stack was performed by TMR Associates who designed the platform and arch, and Eberline Services who provided the survey instrumentation. The project started with the placement of the lifting device. Before the lifting device could be secured upon the top of the stack on the 6-inch wide rim, B771 maintenance workers removed the flashing and lightning rods. To be sure that the lifting device was fitted properly, the crew took measurements at the top of the stack and then drew an exact replica of the device onto a concrete slab located near the stack for minor adjustments. Two ridge cranes performed the work. The first crane raised the lifting device into position and the second crane carried the crew of three workers who would secure the device to the top of the stack.

The platform itself was then attached to the lifting device and lowered onto the stack. Adjustments to the pneumatically controlled platform and equipment were made from the operations center to secure the platform movements and ensure that measuring and video equipment were in the correct positions. Actual measurements took approximately three minutes per sample - 90 seconds to measure and 90 seconds to manipulate the equipment into position for the next measurement.

## The Results & Benefits

All 676 survey measurements were collected as planned with minimal personnel entry into the stack, primarily to

replace batteries in some of the equipment and for minor repairs. The survey results indicated that the bottom 18 feet of the stack would possibly require minimal decontamination for the free release of the stack's structure as defined by DOE standards and regulations. Additional surveys of these suspect areas will be conducted at a later date and any necessary decontamination activities will be performed prior to demolition of the stack.

A cost comparison of this method vs. the two conventional methods considered was also conducted to determine cost effectiveness of the unmanned platform. The findings indicated that the remote sampling method might not have been the most economical; however, from a safety standpoint, it is by far the preferred method.

As this method utilizes the unmanned platform with remote-operated equipment manipulated from a ground level control center outside the stack, the only time that any personnel were exposed to a risk situation was during the installation of the lifting apparatus on the top of the stack. In contrast, both the scaffolding and personnel basket methods would expose workers to the following safety hazards:

- 1) Extended work periods with fall potentials of up to 170 feet.
- 2) Extended work periods inside a ventilation stack with the potential for a radiological release from within the building.
- 3) Extended periods of worker exposure to wind velocities of up to 60 mph.
- 4) Extended periods of worker exposure to adverse air temperatures.
- 5) Extended periods of worker exposure to high noise levels.

The elimination of these safety hazards alone far outweighs the potential for any conceivable cost savings. Also, during the survey operation, several unexpected delays occurred that significantly increased the cost of the project. This was a first-time technology deployment project performed while the stack was in an operational mode. The lessons learned should result in significant cost reductions in similar projects at other sites.

# Technology Supporting the Path to Closure

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